

What is claimed:

1. A contaminant adsorbing article, the article comprising:
  - (a) a body having a thickness of at least 1 cm comprising a plurality of parallel passages extending therethrough in a side-by-side array, the passages having a cross-sectional width of no more than about 5 mm; and
  - (b) a coating substantially covering the passages within the body, the coating comprising a polymeric binder and an adsorbent particulate, the thickness of the coating being no more than 0.5 mm; wherein the article is substantially free of any catalytic activity.
2. The article according to claim 1, wherein the passages have a honeycomb cross-sectional shape.
3. The article according to claim 2, wherein the honeycomb shape is substantially hexagonal.
4. The article according to claim 1, wherein the passages are defined by walls having a thickness of no greater than 0.1 mm.
5. The article according to claim 1, wherein the article has an exposed surface area, defined by the passages, of about 250 cm<sup>2</sup> to 10 m<sup>2</sup>.
6. The article according to claim 1, wherein the coating contains a reactant.
7. The article according to claim 6, wherein the reactant comprises a basic reactant capable of adsorbing an acidic contaminant.
8. The article according to claim 6, wherein the reactant comprises an acidic reactant capable of adsorbing a basic contaminant.

9. The article according to claim 1, wherein the body thickness and the passageway length are about 2 to about 10 cm.
10. The article according to claim 1, wherein the cross-sectional width of the  
5 passageway is about 0.5 to 2 mm.
11. The article according to claim 1, wherein the polymeric binder is one of poly-(2-hydroxyethyl methacrylate), polyethylene glycol, or poly vinyl acetate.
- 10 12. The article according to claim 1, wherein the adsorbent particulate is one of carbon particles, ion exchange media, or zeolite.
13. A system for removing a contaminant from a gas stream, the system comprising.  
(a) an adsorptive article comprising:  
15 (i) a body having a thickness of at least 1 cm and having a plurality of passages extending along the thickness, the passages having an interior surface and a cross-sectional width of no more than 5 mm; the passages defining an inlet of the article and an outlet; and  
(ii) a coating present on the interior surface of the passages, the coating  
20 comprising a polymeric binder and an adsorbent particulate and having a thickness less than 0.5 mm, the coating being substantially free of catalytic activity; and  
(b) a particulate filter in air flow communication with the inlet of the article.
14. The system according to claim 13, wherein the interior surface of the passages has  
25 an exposed surface area of about 250 cm<sup>2</sup> to 10 m<sup>2</sup>.
15. The system according to claim 13, wherein the coating comprises a reactant.
16. The system according to claim 15, wherein the reactant comprises a basic reactant  
30 capable of adsorbing an acidic contaminant.

17. The system according to claim 15, wherein the reactant comprises an acidic reactant capable of adsorbing a basic contaminant.

5 18. A method of removing a contaminant from a gas phase, the method comprising:

(a) installing a contaminant removal article in a pathway for a gas phase, the device comprising:

(i) a body having a thickness of at least 1 cm;

10 (ii) a plurality of passages extending through the body in a side-by-side array, the passages having a cross-sectional width of no more than about 5 mm, the passages having an interior surface area and a coating substantially covering the passages within the body;

15 (iii) the coating comprising a polymeric binder and an adsorbent particulate, the coating having a thickness of no more than about 0.5 mm;

(iv) the article free of catalytic activity;

(b) contacting an input gas stream with the article, the input gas stream containing at least about 1000 ppm of a contaminant; and

20 (c) after contacting, obtaining an output gas stream, the output gas stream containing no more than 10% of the contaminant from the input gas stream.

19. The method according to claim 18, wherein the step of obtaining comprises:

25 (a) obtaining the output gas stream, the output gas stream containing no more than 5% of the contaminant from the input gas stream.

20. The method according to claim 19, wherein the step of obtaining comprises:

30 (a) obtaining the output gas stream, the output gas stream containing no more than 2% of the contaminant from the input gas stream.

21. The method according to claim 18, wherein the contaminant comprises a volatile organic compound.
22. The method according to claim 21, wherein the volatile organic compound  
5 comprises gasoline.
23. The method according to claim 21, wherein the volatile organic compound comprises a volatile silane compound.
- 10 24. The method according to claim 21, wherein the contaminant comprises an acidic contaminant.
25. The method according to claim 21, wherein the contaminant comprises a basic  
15 contaminant.
26. The method according to claim 18, further comprising:  
(a) after the step of removing, releasing at least a portion of the contaminant  
from the coating.
- 20 27. The method according to claim 26, wherein the step of releasing the contaminant comprises:  
(a) releasing at least a portion of the contaminant based on resumption of flow  
of the gas phase through the article.
- 25 28. The method according to claim 26, wherein the step of releasing the contaminant comprises:  
(a) releasing at least a portion of the contaminant by application of heat to the  
article.

29. The method according to claim 18, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:

- (a) installing the contaminant removal article in an industrial process air locus or commercial building air cleaning locus.

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30. The method according to claim 18, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:

- (a) installing the contaminant removal article in semiconductor processing locus.

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31. The method according to claim 18, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:

- (a) installing the contaminant removal article in an air induction system in a vehicle engine.

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32. The method according to claim 31, wherein the air induction system comprises a tubular member having an air intake and an opposite outflow directed to an engine intake, the tubular member comprising an installation locus adapted retain the contaminant removal article.

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33. The method according to claim 32, wherein the air induction system further comprises a particulate filter element.

34. The method according to claim 18, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:

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- (a) installing the contaminant removal article on a fuel cell oxidant stream.

35. A method of removing a contaminant from a gas phase, the method comprising:

- (a) installing a contaminant removal article in a pathway for a gas phase, the device comprising a body having a thickness of at least 1 cm, the body

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- comprising a plurality of passages extending through the body in a side-by-side array, the passages having a cross-sectional width of no more than about 5 mm, the passages having an interior surface and a coating substantially covering the interior surface, the coating comprising a polymeric binder and an adsorptive particulate, the coating having a thickness of no more than 0.5 mm, and the article having only incidental catalytic properties;
- (b) contacting a gas-phase with the article, the gas-phase having contaminant present at a level of 50 ppm-volume to 2 ppb-volume; and
- (c) removing at least 99% of the contaminant from the gas-phase with a pressure drop of no greater than 1 inch water at an airflow filter face velocity of 0.5 m/s.
36. The method according to claim 35, wherein the step of removing comprises:
- (a) removing at least 99% of the contaminant from the gas-phase with a pressure drop of no greater than 0.5 inch water at an airflow filter face velocity of 0.5 m/s.
37. The method according to claim 35, wherein the step of removing comprises:
- (a) removing at least 99% of the contaminant from the gas-phase with a pressure drop of no greater than 0.1 inch water at an airflow filter face velocity of 0.5 m/s.
38. The method according to claim 35, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:
- (a) installing the contaminant removal article in an industrial process air locus or commercial building air cleaning locus.
39. The method according to claim 35, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:

- (a) installing the contaminant removal article in semiconductor processing tool locus.

40. The method according to claim 35, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:

- (a) installing the contaminant removal article in an air induction system in a vehicle engine.

41. The method according to claim 40, wherein the air induction system comprises a tubular member having an air intake and an opposite outflow directed to an engine intake, the tubular member comprising an installation locus adapted retain the contaminant removal article.

42. The method according to claim 41, wherein the air induction system further comprises a particulate filter element.

43. The method according to claim 35, wherein the step of installing a contaminant removal article in a pathway for a gas phase comprises:

- (a) installing the contaminant removal article on a fuel cell oxidant stream.

44. A method of manufacturing an adsorptive coated article, the article comprising a body having a thickness of at least 1 cm and comprising a plurality of passages extending therethrough in a side-by-side array, the passages having a cross-sectional width of no more than about 5 mm, the method comprising:

- (a) forming a dispersion comprising a polymer composition and a particulate adsorbent;
- (b) contacting the passages with the dispersion to form a wet coating; and
- (c) removing the solvent from the wet coating leaving an active adsorbent layer;

wherein the adsorbent layer is substantially free of catalytic activity.

45. The method according to claim 44, wherein the step of forming a dispersion comprises:

- 5 (a) forming a dispersion comprising the polymer composition, the particulate adsorbent, and a solvent.

46. A method of manufacturing an adsorptive coated article, the article comprising a body having a thickness of at least 1 cm and comprising a plurality of passages extending therethrough in a side-by-side array, the passages having a cross-sectional width no  
10 greater than about 5 mm, the method comprising:

- (a) forming a mixture comprising an adsorbent particulate and a polymeric adhesive, the polymeric adhesive present at a temperature above the melting point of the polymeric adhesive;
- (b) contacting the passages with the mixture to form a melt coating; and
- 15 (c) cooling the melt coating to at least partially solidify the polymeric adhesive, leaving an active adsorbent layer.

47. The method according to claim 46, wherein the melt coating has a thickness of no greater than 0.5 mm.  
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48. An apparatus for removing a contaminant from an atmosphere in a semiconductor production locus, the apparatus comprising:

- 25 (a) an adsorptive element comprising a body having a thickness of at least 1 cm and comprising a plurality of passages extending therethrough in a side-by-side array, the passages having a cross-sectional width no greater than about 5 mm, the element comprising a coating less than about 0.5 mm thick substantially covering the passages, the coating comprising a polymeric binder and an adsorptive particulate and having only incidental catalytic activity;



- (b) a housing having an inlet, an outlet, a receiving volume for the adsorptive element, each of the inlet and outlet in air flow communication with the passages of the adsorptive element; and
- (c) means to move the atmosphere through the element.

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49. The apparatus according to claim 48 comprising at least three adsorptive elements, a first element comprising an acidic reactive to remove basic contaminants, and a second element comprising a basic reactive to remove acidic contaminants.

- 10 50. An air induction system in a vehicle engine, the induction system comprising:
- (a) a tubular member having an air intake and an opposite outflow directed to an engine intake, the tubular member comprising an installation locus; and
  - (b) a contaminant adsorbing element comprising a body having a thickness of
- 15 therethrough in a side-by-side array, the passages having a major width less than about 5 mm and a coating substantially covering the passages, the coating comprising a polymeric binder and a carbon particulate, the coating having a thickness of no greater than about 0.5 mm, the article free of catalytic activity, the adsorbing element positioned within the
- 20 installation locus.

51. The air induction system according to claim 50, wherein the element has a first face and a second face, each of the first face and the second face having an area of 77.5 to 155 cm<sup>2</sup>.

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52. The air induction system according to claim 50, wherein the contaminant adsorbing element has a generally rectangular shape.

53. The air induction system according to claim 50, wherein the adsorbing element is

30 configured to adsorb gasoline vapors.

54. The air induction system according to claim 50, wherein the adsorbing element is configured to adsorb diesel.
- 5 55. The air induction system according to claim 50, wherein the adsorbing element is permanently fixed within the tubular member.
56. The air induction system according to claim 50, wherein the adsorbing element is configured to adsorb contaminants from an air stream at a first air flow rate of the air  
10 stream, and to desorb contaminants from the coating at a second air flow rate, the second air flow rate being greater than the first air flow rate.
57. The air induction system according to claim 50, wherein the adsorbing element is constructed to adsorb at least 90% of contaminants passing through the tubular member.

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